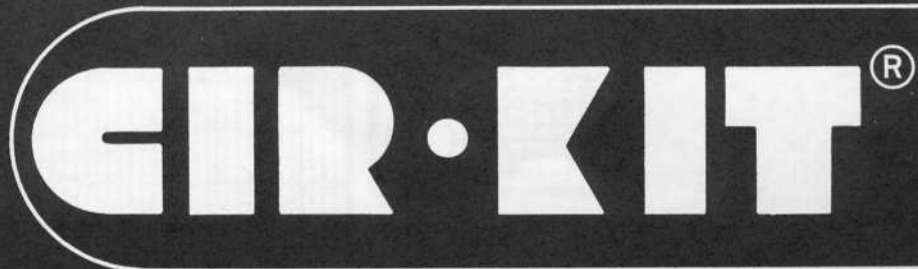


- BASIC 6993-0037
- ADVANCED 6993-0077
- MASTER 6993-0082



REPAIR AND REPLACEMENT SYSTEMS FOR LAND, CONDUCTOR,
THRU-HOLE, CORNER, T, DIP PAD, AND EDGE CONNECTOR

INSTRUCTION MANUAL
NO. 5050-0048 REV. H

MANUFACTURED UNDER ONE OR MORE
OF THE FOLLOWING U.S. PATENT NOS.
3,411,594; 3,461,687; 3,526,750; 3,557,821;
3,588,854; 3,609,791; 3,611,749; 3,612,112;
3,705,680; 3,715,708; 3,739,141; 3,752,017;
3,826,483; 3,940,590; 4,089,619; 4,157,481;
4,181,477; 4,187,972; 4,225,076; 4,227,759;
4,269,343;

DES. 210,730; 214,865; 226,068; 268,024
AND U.K. PATENT: 1,448,545

GENERAL INFORMATION

CIR-KITS™ were created by PACE, Inc. for the modification or repair of lifted, damaged or missing lands, plated thru-holes, conductors and edge connectors on Printed Circuit Assemblies.

Three different CIR-KIT Models (Basic, Advanced and Master) are available to suit various types and levels of repair in the factory or field. These

models include combinations of STRAIGHT-TRAK, SHAPED-TRAK, TRAK-PAD, D.I.P. -PAD and EDGE CONNECTORS each in a "Selector Frame" with various sizes and finishes (see Figure 1). In addition, combinations of Tools; Abrasives; Funnelets/Eyelets; Coatings; Bonding agents; and other Materials, Aids and Equipment are available.

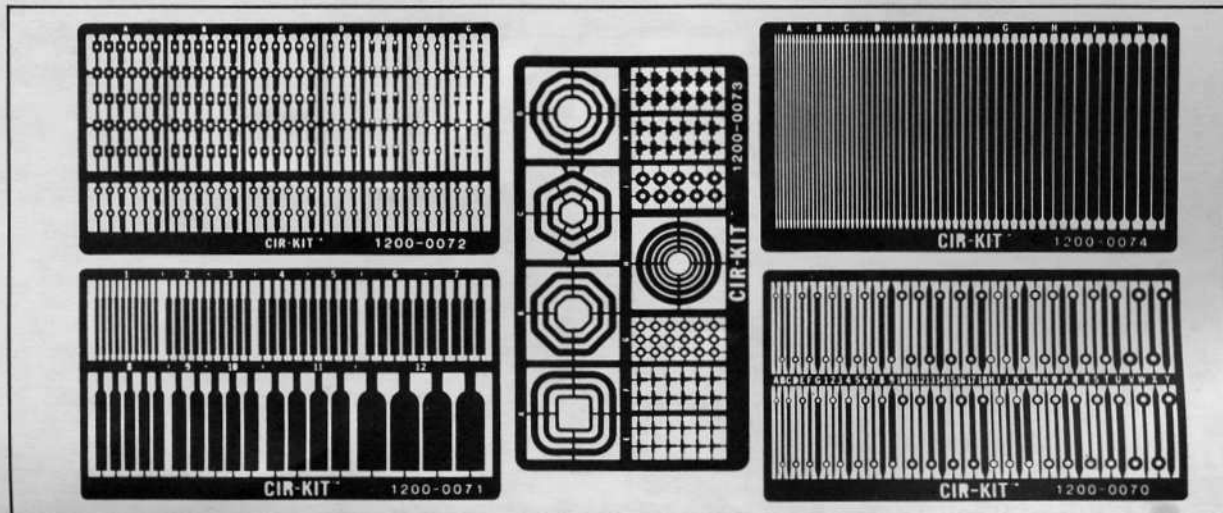


FIGURE 1. SELECTOR FRAMES

Printed Circuit Assemblies may be damaged during faulty soldering or component removal; or from component failure, improper handling or usage (see Figure 2).

CIR-KIT provides a practical solution for restoring the operational reliability to damaged assemblies or the means for modifying circuitry as desired.

INSTRUCTIONS FOR REPAIRING DAMAGED TRACK/PAD OR PLATED THRU-HOLE (PTH)

Use the following instructions (step-by-step) for trouble-free results:

STEP 1—Overlay the appropriate TRAK-PAD from the "Selector Frame", (see Figure 3) matching the missing or damaged circuit(s) and note the identifying letter on the frame as a reference (see Trak-Pad/Eyelet Data Chart) to determine (a) proper size "Ball Mill" for drilling; (b) correct Funnelet/Eyelet diameter; (c) correct Funnelet/Eyelet length. Refer to Pad Tabulation Chart (in back of manual) for sizes.

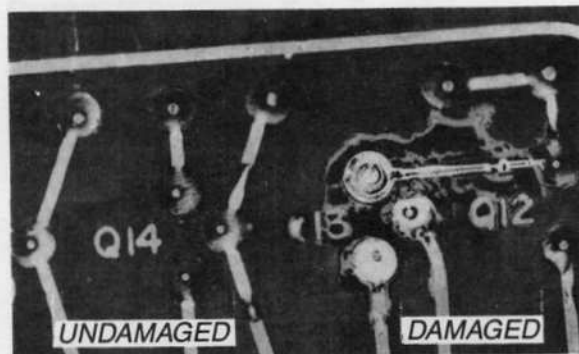


FIGURE 2. UNDATED AND DAMAGED PRINTED CIRCUIT ASSEMBLIES



FIGURE 3. MATCHING TRAK-PADS

STEP 2—Trim the damaged/lifted land and conductor with a PACE Pro/Vise™ at point of good bond (see Figure 4). (**NOTE:** If coating is present, remove coating from area that is to be repaired with the PACE Minichine™ Abrasive Wheel. Double-sided boards will require preparation to both sides).

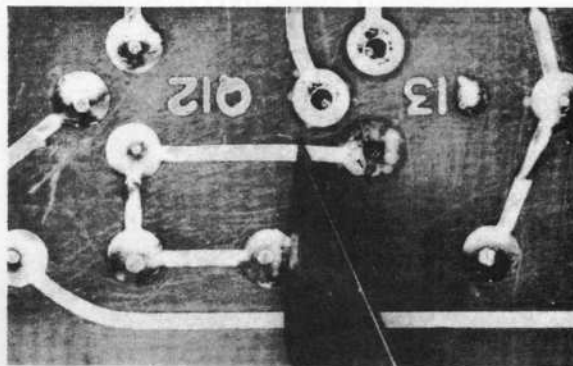


FIGURE 4. TRIMMING DAMAGED PAD

STEP 3—Using the Ball Mill recommended in TRAK-PAD/EYELET DATA CHART, drill out the damaged hole (see Figure 5). This removes the damaged plating and prepares the hole to accept the new Funnelet/Eyelet. Check for “burrs” that may prevent the Funnelet/Eyelet from inserting properly. A correct size Funnelet/Eyelet should slide easily into the drilled hole with a slight clearance. Check Funnelet/Eyelet “I.D.” to insure that component lead will fit. (**NOTE:** This procedure is not recommended for multi-layer Printed Circuit Boards).

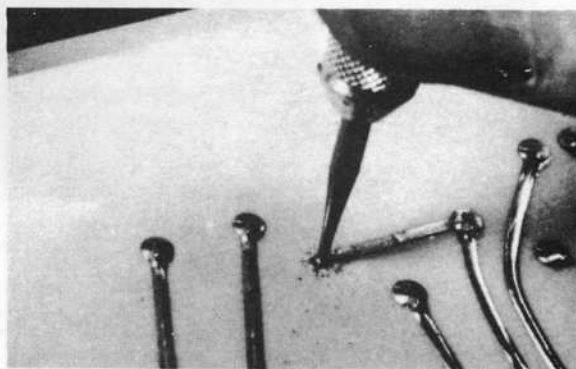


FIGURE 5. DRILLING OUT DAMAGED HOLE

STEP 4—Clean the remaining conductor where the TRAK-PAD will overlap with a PACE Abrasive Stick and then with PACE Solvent. Pre-tin $\frac{1}{8}$ " to $\frac{1}{4}$ " of conductor using .010 or .015 rosin core solder (see Figure 6). Remove all flux residue with PACE Solvent.

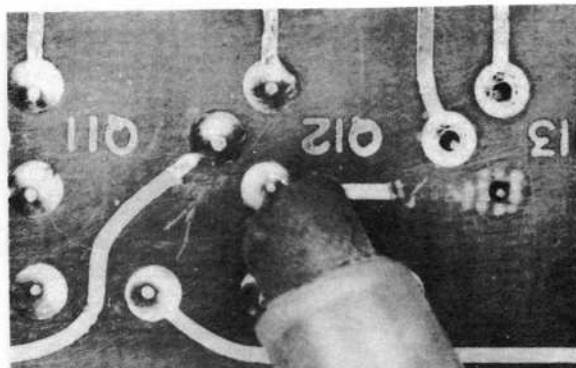


FIGURE 6. CLEANING CONDUCTOR

STEP 5—On a flat surface, carefully prepare both sides of the replacement TRAK-PAD using a PACE Abrasive Stick (see Figure 7). Clean thoroughly with PACE Solvent.

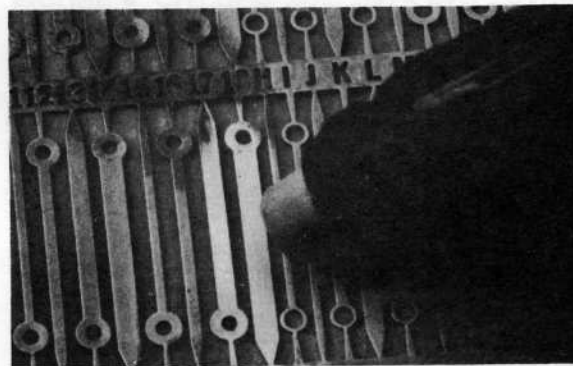


FIGURE 7. CLEANING TRAK-PAD

STEP 6—Cut the prepared TRAK-PAD from the “Selector Frame” leaving sufficient length so that the track overlaps the conductor a minimum of $\frac{1}{8}$ ” (see Figure 8).

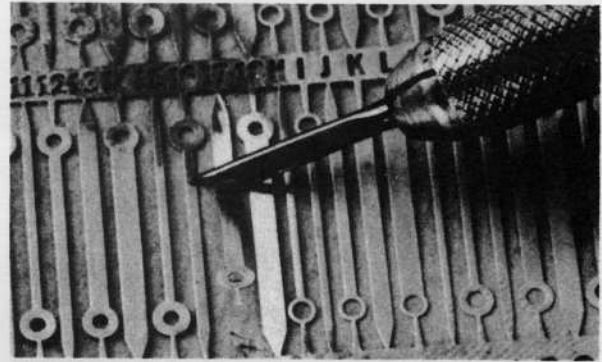


FIGURE 8. CUTTING THE TRAK-PAD TRACK

STEP 7—Insert the selected Funnelet/Eyelet into the prepared hole. Insert Support Tool with base into head of Funnelet/Eyelet. (see Figure 9). Flip board over and rest on Support Tool while stabilizing board with your hand.

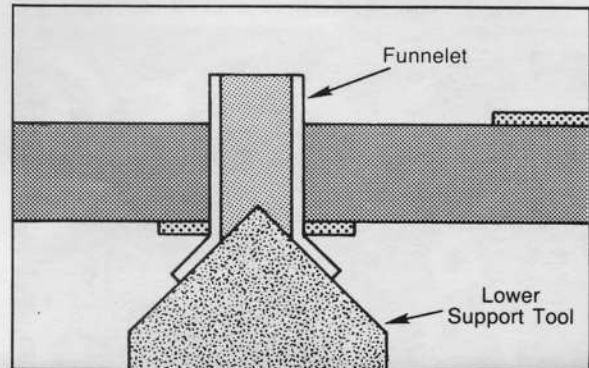


FIGURE 9. INSERTING FUNNELET/EYELET

STEP 8—Position the hole of the previously prepared TRAK-PAD Track (Steps 5 and 6) over the Funnelet/Eyelet barrel (see Figure 10). (**NOTE:** The TRAK-PAD may be taped into position with existing conductor before you swage set the Funnelet/Eyelet).

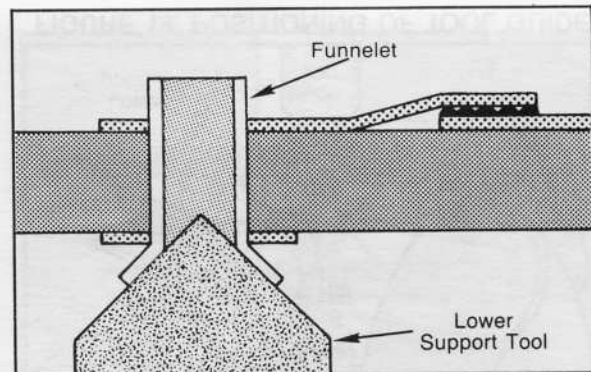


FIGURE 10. POSITIONING TRAK-PAD TRACK

STEP 9—Slide the PACE Tool Guide (Advanced and Master Kits only) into the Setting Tool (see Figure 11). (**NOTE:** Steps 7 and 8 are suggested methods, you may vary to suit your personal requirements).

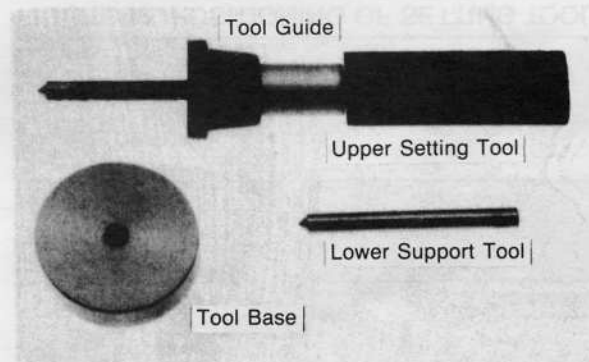


FIGURE 11. TOOL GUIDE AND SETTING TOOL

STEP 10—Position the Setting Tool Tip into the Funnelet/Eyelet barrel (see Figure 12).

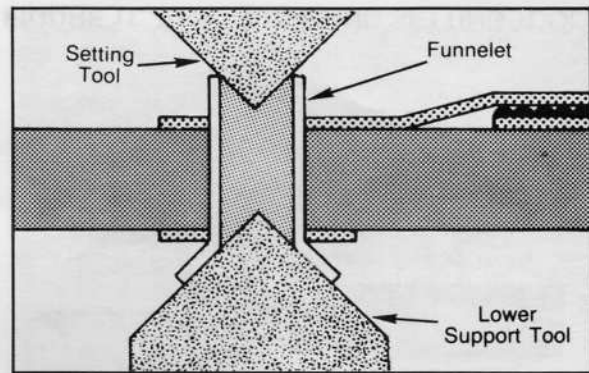


FIGURE 12. POSITIONING OF SETTING TOOL

STEP 11—Slide Tool Guide (Advanced and Master Kits only) down against the Printed Circuit Board and hold firmly into place (see Figure 13). (**NOTE:** The Tool Guide will maintain alignment between Setting Tool and Funnel/Eyelet barrel).

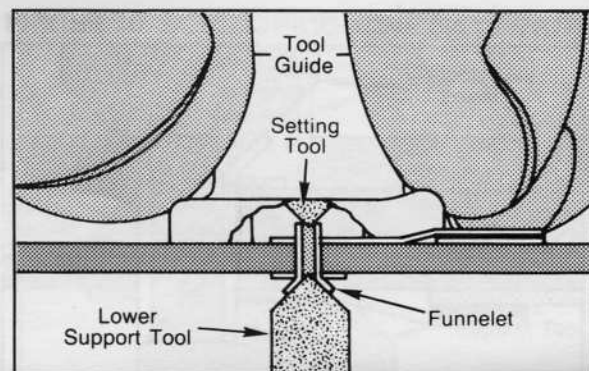


FIGURE 13. POSITIONING OF TOOL GUIDE

STEP 12—Push down firmly on Setting Tool to swage set the Funnelet/Eyelet in place (see Figure 14). (**NOTE:** Make sure the Support Tool is held firmly in place).

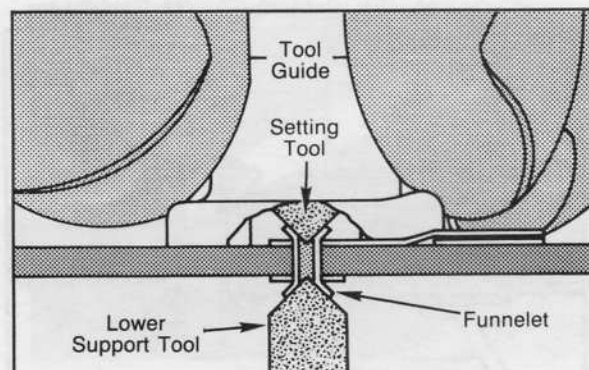


FIGURE 14. SWAGE SETTING OF FUNNELET

STEP 13—After setting Funnelet/Eyelet, check alignment and overlap of the TRAK-PAD Track with existing conductor (see Figure 15). (*If alignment is necessary, insert Pro/Vise blade into Funnelet/Eyelet barrel and turn for fine alignment. This avoids bending of Track*). Solder Funnelet/Eyelet to Pad or Land. (**NOTE:** PACE Fused Eyeletting Systems provide the means for "Flat Setting" and "Hot Fusing" pre-tinned Eyelets to create the most reliable interface repair for damaged Plated Thru-Holes (PTH) on double-sided boards. (See Equipment and Training).

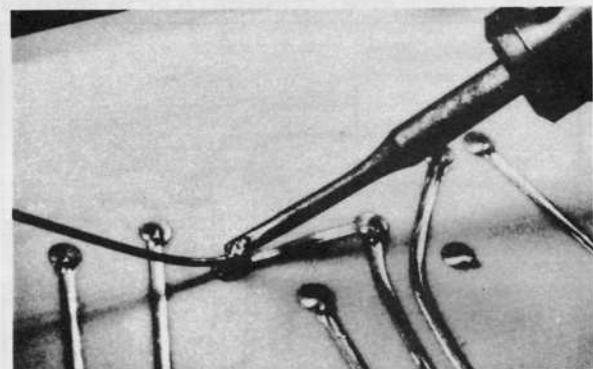


FIGURE 15. SOLDERING FUNNELET TO TRACK

STEP 14—Insert component leads and solder in place (see Figure 10). (**NOTE:** Additional soldering may be required on opposite side of double-sided circuit boards).

STEP 15—Apply PACE Liquid Flux (or equivalent) to the Track overlap area. Reflow solder the Track to the circuit board (see Figure 17). The PACE LapFlo Soldering Tool (see Equipment and Training) is ideally suited for this operation. The LapFlo Soldering tool tip can be used to locate, clamp and heat the Track and maintain force during the cool down, preventing a disturbed joint. This clamping action provides the strongest bond possible. (**NOTE:** If a LapFlo Tool is not available, a soldering iron (20-22 watts max.) with a 1/16" tip may be used instead as follows: (a) after fluxing the Track overlap area, apply the soldering tip to the lap joint while carefully holding the Track in place with a tweezer; (b) remove the heat after solder has flowed, but continue holding the Track until solder cools).

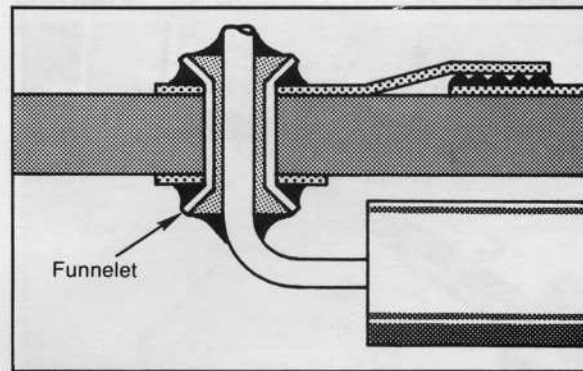


FIGURE 16. SOLDERING COMPONENT LEADS

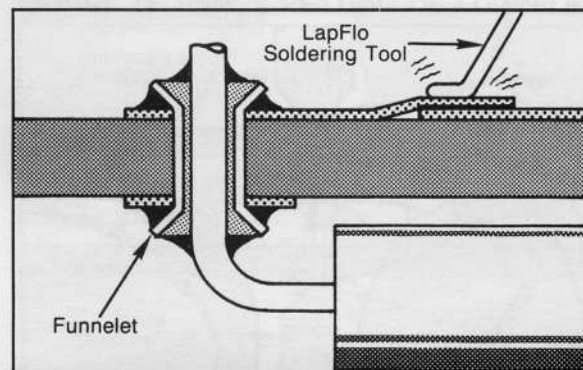


FIGURE 17. REFLOW SOLDER TRACK

STEP 16—Clean the area to remove all flux residue with PACE Solvent. This completes the repair of a TRAK-PAD/Land configuration (see Figure 18). Re-coat the repaired area with a conformal coating compatible with existing board coating material. A coating with a suitable epoxy over the TRAK-PAD Track area will provide an "Overbonding" effect.

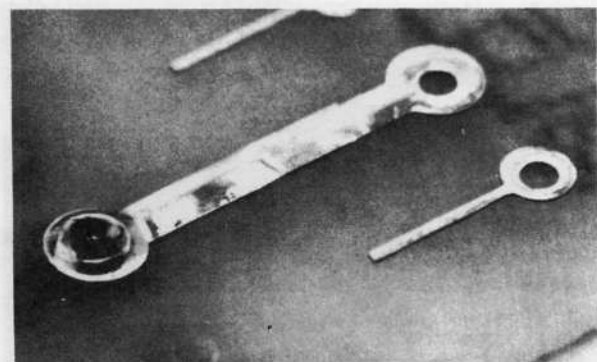


FIGURE 18. COMPLETED CONDUCTOR REPAIR

QUALITY ASSURANCE CRITERIA

Quality assurance for conductor, TRAK-PAD Track and Plated Thru-Hole (PTH) Repair (see Figure 19).

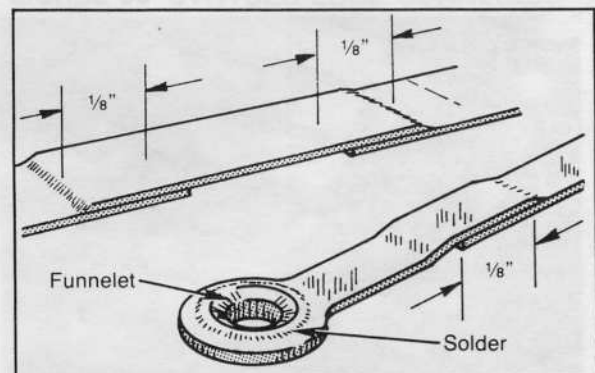


FIGURE 19. QUALITY ASSURANCE CRITERIA

INSTRUCTIONS FOR REPAIRING AND BONDING EDGE CONNECTORS

STEP 17. Remove the damaged Edge Connector from board, making certain that you do not damage any other areas of board (see Figure 20).

NOTE: If the Edge Connector has become loose or lifted from the board, *DO NOT* replace, simply reattach with Adhesive and Activator (see Step 21).

STEP 18. Remove any and all residue from the board area of the Edge Connector using the PACE Abrasive Stick. Clean excess area, with PACE Solvent (see Figure 21).

STEP 19. Select the proper Edge Connector from the frame assembly. Cut to correct length, allowing $\frac{1}{8}$ " overlap at both ends of Edge Connector. Pretin the Edge Connector and the conductor area at point of connection (see Figure 22).

STEP 20. Temporarily tape new Edge Connector in place before applying adhesive. Apply PACE Liquid Flux (or equivalent) to the Connector overlap area. Reflow solder the Connector to the track (see Figure 23). The PACE LapFlo Soldering Tool (see Equipment and Training) is ideally suited for this operation. (Refer to STEP 15 for reflow instructions).

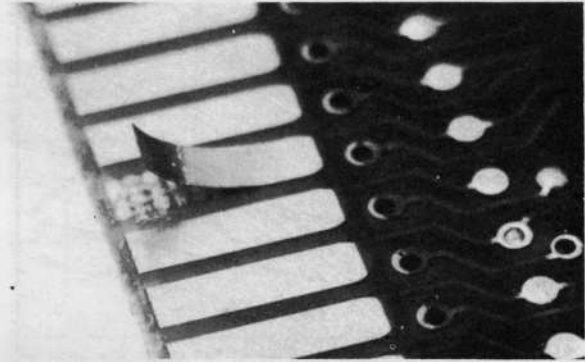


FIGURE 20. DAMAGED EDGE CONNECTOR

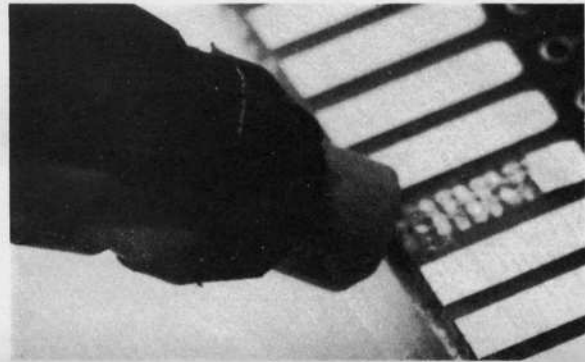


FIGURE 21. CLEANING CONNECTOR AREA



FIGURE 22. MATCHING EDGE CONNECTORS

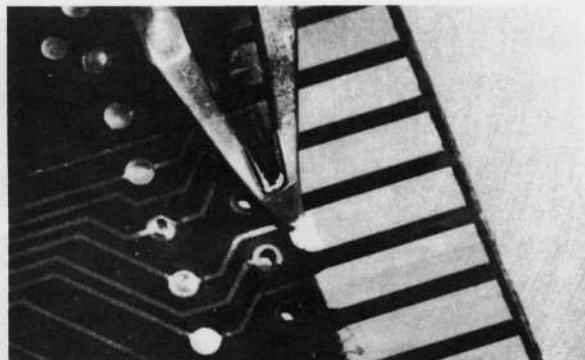


FIGURE 23. REFLOW SOLDER CONNECTOR

STEP 21. Apply Activator to the area of the board where the Edge Connector is to be placed. Apply a light coating of Adhesive to the Edge Connector (see Figure 24). Position Connector to board, pressing firmly to squeeze excess Adhesive. **NOTE:** Do not use Activator if it has become discolored.

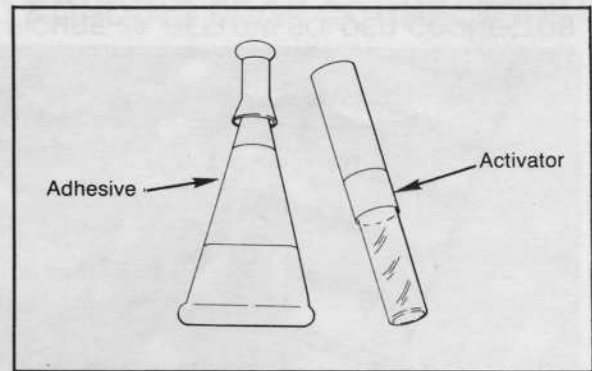


FIGURE 24. ACTIVATOR AND ADHESIVE

STEP 22. Secure Edge Connector to board using the Edge Connector Clamp Assembly (see Figure 25). Allow approximately 5 minutes for set up before removing the Clamp. Clean excess Adhesive from area using the Abrasive Stick and Solvent. Allow 24 hours for complete bonding cure.

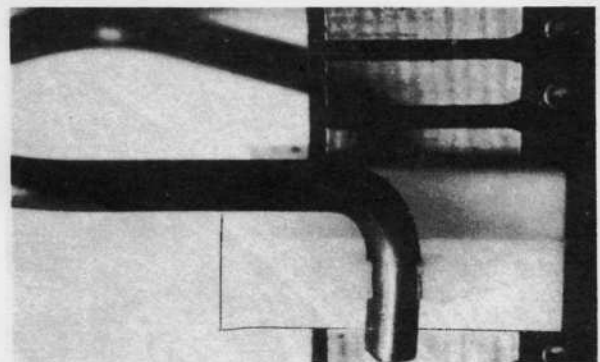


FIGURE 25. EDGE CONNECTOR CLAMP

STEP 23. Using a pair of scissors, cut the excess Edge Connector from the board (see Figure 26).

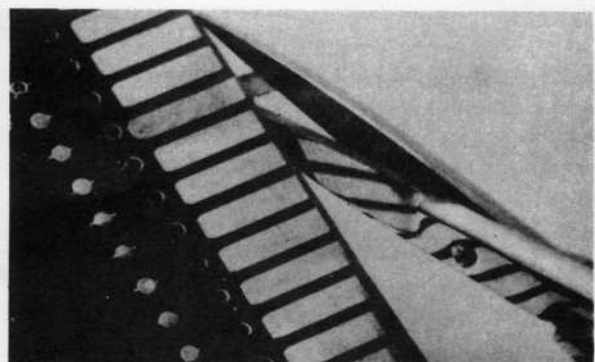


FIGURE 26. TRIMMING EDGE CONNECTOR

STEP 24. Using a file, chamfer the edge of the Edge Connector for a smooth, even finish (see Figure 27). **NOTE:** Insure that the file is used with application only in the direction shown.

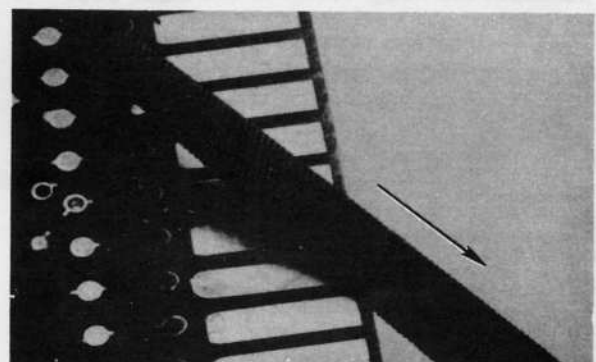


FIGURE 27. FILING EDGE CONNECTOR

STEP 25. It is recommended that you replate the Edge Connector using the PACE Gold Plating System (see Figure 28). Refer to Equipment and Training for Gold Plating System. The replacement connectors are nickel plated, therefore, a gold electroplate solution can be applied directly to this surface.

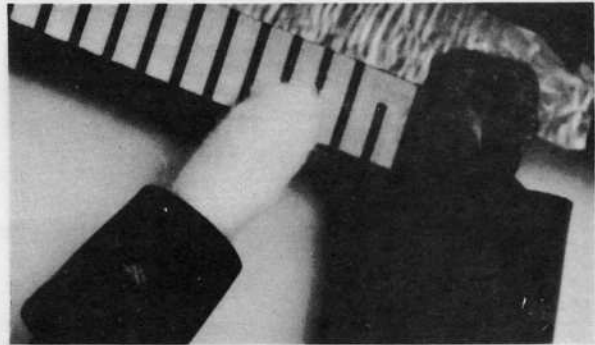


FIGURE 28. GOLD PLATING

ORDERING INFORMATION

Different sizes of TRAK-PADS are provided on the "Selector Frame" (PACE Part No. 1200-0070). The letter on the support between each identical pair identifies the TRAK-PAD. (See TRAK-PAD/EYELET DATA CHART). Complete frames of a single-size TRAK-PAD are available as follows:

EXAMPLE: PACE Part No. 1200-0070L—All TRAK-PADS on the frame are of one size and the same dimensions as "L" on the "Selector Frame". Request quotation on the "Series 1" TRAK-PADS of single size. Most sizes are available from stock. The STRAIGHT-TRAK Selector Frame (PACE Part

No. 1200-0070) are available. They are prepared and applied in a similar manner as the Track portion of the TRAK-PADS (see instructions).

NOTE: PACE, Inc. stocks 40 different sizes of Funnelets/Eyelets. Contact your PACE distributor/representative for complete Funnelet/Eyelet information.

CONDUCTOR REPAIR

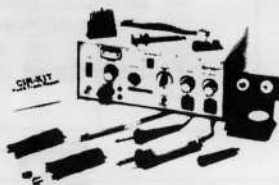
When only a conductor must be repaired, use the STRAIGHT or SHAPED-TRAKS and follow the preparation and techniques described in STEP 15. **(NOTE:** No Funnelet/Eyelets are required for this operation.

BONDING AND COATING

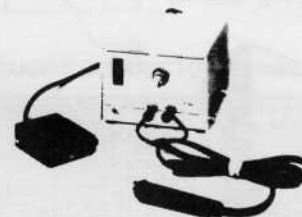
If bonding of the Track to the circuit board is required, use an "Overbonding" technique by applying the coating material over the top of the circuitry so as to overflow onto the board and form a bond with the baseboard material. **DO NOT** attempt to "Underbond" between the circuitry and

baseboard before soldering operation is completed since this may contaminate the solder joint area. For controlled "Underbonding" of circuit elements, get the details on PACE Bonding Selector Kits.

EQUIPMENT AND TRAINING SECTION



Complete PCB
Rework/Repair System
Model PRC-151



Hot Shot LapFlo Tool



Training Packages

- Rework and Repair for Electronic Training Programs
- Basic Soldering for Electronic Training Programs (eleven languages available).



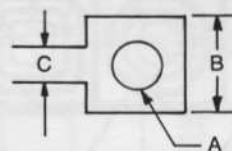
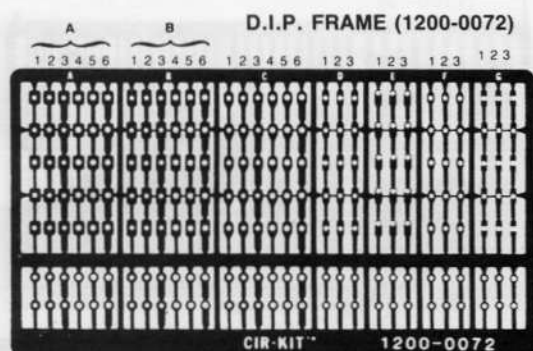
Portable Desoldering/
Soldering System



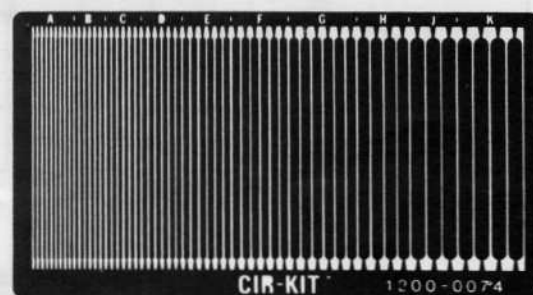
Gold Plating

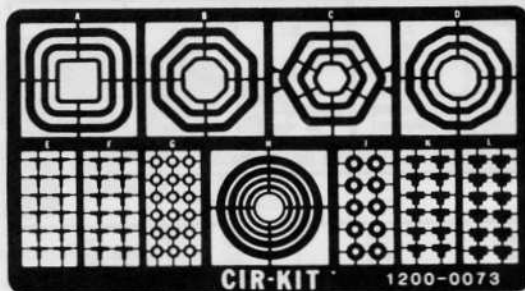
D.I.P. PAD TABULATION CHART				
Frame Designation	"A" Width + .005	"B" Width		"C" Width
		Rectangular Lands	Round Lands	
A1	.031	.080	.070	.020
A2	.031	.080	.070	.025
A3	.031	.080	.070	.050
A4	.041	.080	.070	.020
A5	.041	.080	.070	.025
A6	.041	.080	.070	.050
B1	.031	.070	.070	.025
B2	.031	.070	.070	.031
B3	.031	.070	.070	.050
B4	.041	.070	.070	.025
B5	.041	.070	.070	.031
B6	.041	.070	.070	.030
C1	.031	.070	.070	.025
C2	.031	.070	.070	.031
C3	.031	.070	.070	.050
C4	.041	.070	.070	.025
C5	.041	.070	.070	.031
C6	.041	.070	.070	.050
D1	.031	.050	.062	.025
D2	.031	.050	.062	.031
D3	.031	.050	.062	.031
E1	.031	.050	.062	.025
E2	.031	.050	.062	.031
E3	.031	.050	.062	.031
F1	.031	.050	.062	.020
F2	.031	.050	.062	.031
F3	.031	.050	.062	.031
G1	.031	.041	.062	.025
G2	.031	.041	.062	.031
G3	.031	.041	.062	.031

CONDUCTOR TABULATION CHART					
Conductor Designation	Conductor Width	No. of Conductors	Conductor Designation	Conductor Width	No. of Conductors
A	.015 ± .003	9	F	.051	6
B	.020 ± .003	6	G	.062	6
C	.025	6	H	.075	4
D	.031	6	J	.093	3
E	.041	6	K	.100	4



STRAIGHT CONDUCTOR FRAME (1200-0074)

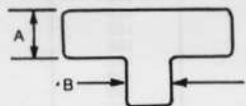




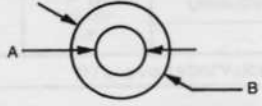
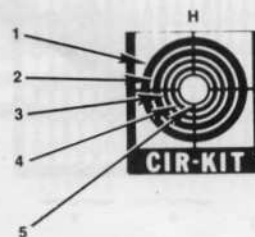
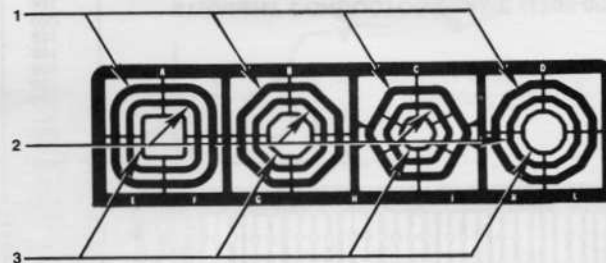
VARIETY FRAME (1200-0073)

ANGLE TRACK TABULATION CHART					
Frame Designation	TRACK WIDTH				
	1	2	3	4	5
A	.062	.051	.031		
B	.062	.031	.031		
C	.062	.031	.031		
D	.062	.051	.031		
H	.062	.051	.041	.031	.020

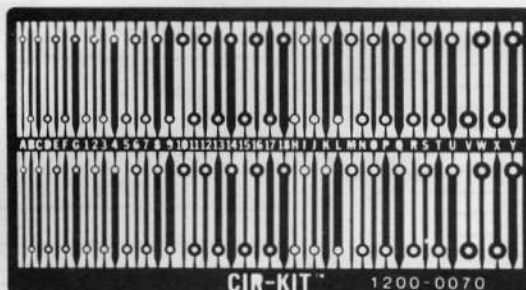
"T" TABULATION CHART			
Frame Designation	"A" Width	"B" Width	No. of T's
E	.020 + .003	.020 ± .003	12
F	.031	.031	12
K	.051	.051	12
L	.062	.062	12



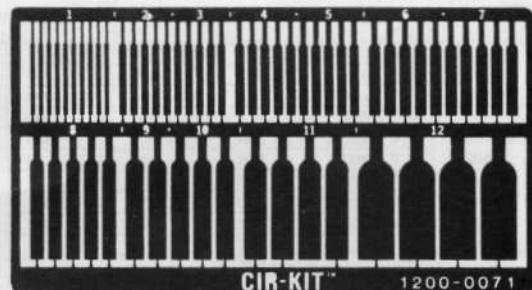
PAD TABULATION CHART			
Frame Designation	"A" Width	"B" Width	No. of Pads
G	.051	.093	18
J	.051	.125	10

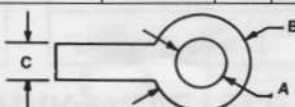
TRAK PAD FRAME (1200-0070)



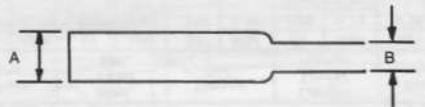
EDGE CONNECTOR FRAME (1200-0071)



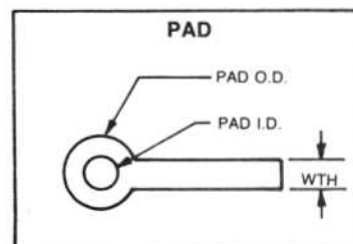
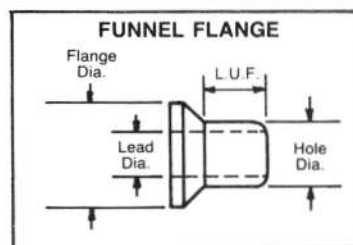
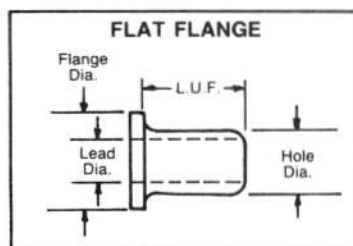
PAD TABULATION CHART							
Pad Designation	"A" Dia. $\pm .003$	"B"	"C"	Pad Designation	"A" Dia. $\pm .003$	"B"	"C"
A	.033	.050	.020	1	.040	.062	.020
B	.033	.050	.025	2	.040	.062	.025
C	.033	.050	.031	3	.040	.062	.031
D	.033	.062	.020	4	.040	.062	.050
E	.033	.062	.025	5	.040	.075	.020
F	.033	.062	.031	6	.040	.075	.025
G	.033	.062	.050	7	.040	.075	.031
H	.049	.075	.020	8	.040	.075	.050
I	.049	.075	.025	9	.040	.075	.062
J	.049	.075	.031	10	.040	.093	.020
K	.049	.075	.050	11	.040	.093	.025
L	.049	.075	.062	12	.040	.093	.031
M	.049	.093	.020	13	.040	.093	.050
N	.049	.093	.025	14	.040	.093	.062
O	.049	.093	.031	15	.040	.100	.025
P	.049	.093	.050	16	.040	.100	.031
Q	.049	.093	.062	17	.040	.100	.050
R	.049	.100	.025	18	.040	.100	.062
S	.049	.100	.031				
T	.049	.100	.050				
U	.049	.100	.062				
V	.049	.125	.025				
W	.049	.125	.031				
X	.049	.125	.050				
Y	.049	.125	.062				



EDGE CONNECTOR TABULATION CHART			
Connector Designation	"A" Width	"B" Width	No. of Connectors
1	.031	.020 ± .003	10
2	.051	.025	5
3	.051	.031	5
4	.062	.031	5
5	.062	.041	5
6	.080	.041	5
7	.080	.041	5
8	.100	.051	5
9	.125	.051	2
10	.125	.062	3
11	.156	.062	4
12	.250	.093	4



TRAK-PAD/EYELET DATA CHART

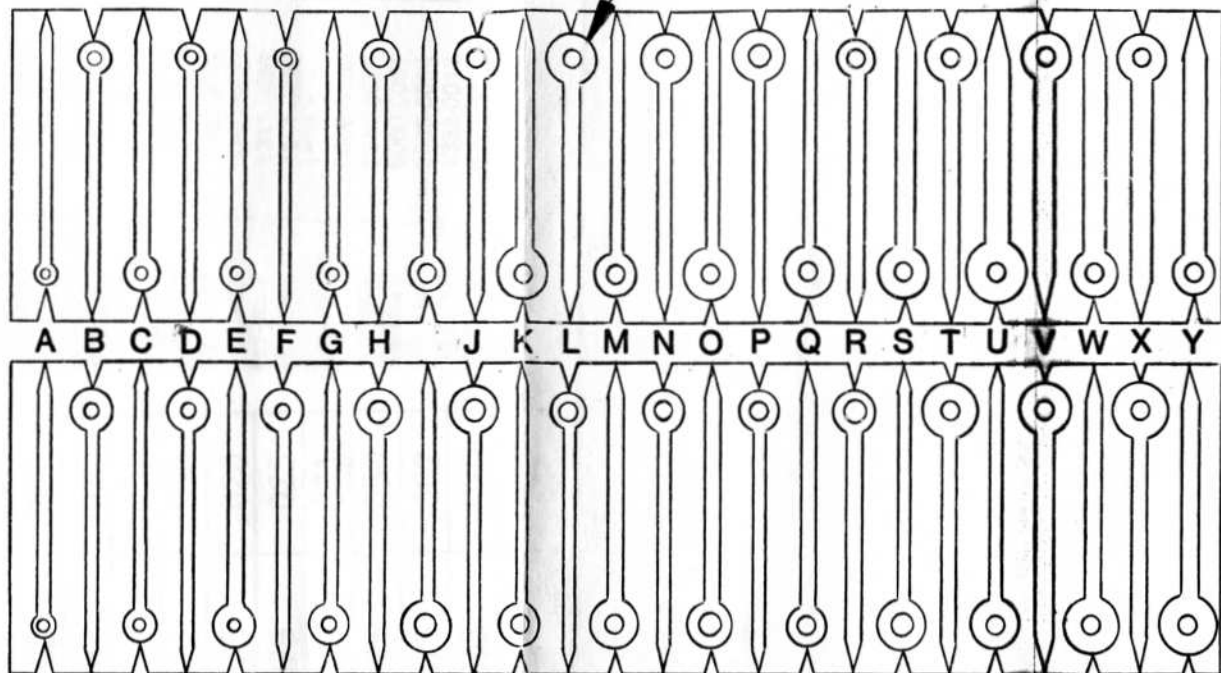


EYELET TYPE	Eyelet P/N	PCB Thickness		Hole Dia.		Max. Lead Dia.		Flange Dia.		Length Under Flange		Track Pad
		IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	
Series 1 Flat Flange Eyelets	1347-											1200-0070
	0012	.010	0.25	.031	0.79	.020	0.50	.046	1.16	.028	0.71	A thru G
	0014	.047	1.19							.069	1.75	
	0016	.062	1.60							.088	2.23	
	0019	.125	3.20							.174	4.42	
Series 2 Funnel Head Eyelets, 60°	0050	.015	0.38	.040	1.02	.027	0.68	.062	1.57	.051	1.30	1 thru 18
	0051	.031	0.79							.066	1.68	
	0057	.047	1.19							.075	1.90	
	0052	.047	1.19							.082	2.08	
	0053	.062	1.60							.098	2.49	
	0054	.093	2.38							.129	3.28	
Series 3 Funnel Head Eyelets, 90°	0006	.015	0.38	.047	1.19	.035	0.89	.080	2.03	.052	1.32	H thru Y
	0007	.031	0.79							.062	1.57	
	0009	.062	1.60							.093	2.36	
	0010	.093	2.38							.118	3.00	
Series 4 Flat Flange Eyelets	0058	.031	0.79	.047	1.19	.033	0.84	.080	2.03	.062	1.57	H thru Y
	0030	.047	1.19					.076	1.93	.075	1.90	
	0026	.062	1.60					.076	1.93	.093	2.36	
	0056	.062	1.60					.076	1.93	.100	2.54	
	0024	.093	2.38					.080	2.03	.122	3.10	
	0029	.125	3.18					.076	1.93	.160	4.06	
Misc. Flat Flange Eyelets	0013	.015	0.38	.030	0.76	.020	0.51	.046	1.16	.054	1.37	A thru G
	0022	.031	0.79	.036	0.91	.022	0.56	.070	1.78	.060	1.52	1 thru 18
	0015	.047	1.19	.030	0.76	.020	0.51	.046	1.16	.073	1.85	A thru G
	0055	.062	1.60	.060	1.52	.045	1.14	.090	2.29	.093	2.36	
	0017	.062	1.60	.031	0.79	.020	0.51	.046	1.16	.094	2.39	A thru G
	0039	.062	1.60	.040	1.02	.025	0.64	.060	1.52	.093	2.36	1 thru 18
Misc. Funnel Flange Eyelets	0036	.062	1.60	.068	1.73	.058	1.47	.114	2.90	.102	2.59	
	0001	.031	0.79	.040	1.02	.025	0.64	.065	1.65	.047	1.19	1 thru 18
	0002	.062	1.60	.060	1.52	.045	1.14	.095	2.40	.088	2.23	
	0042	.062	1.60	.078	1.98	.064	1.63	.110	2.79	.090	2.29	

TABLE 1. REPLACEMENT PARTS FOR CIR-KIT UNITS (BASIC, ADVANCED AND MASTER)

Description	CIR-KIT		
	Basic	Advanced	Master
CIR-KIT	6993-0037	6993-0077	6993-0082
Eyelet, Printed Circuit	1347-0013	1347-0013	1347-0013
Eyelet, Printed Circuit	1347-0016	1347-0016	1347-0016
Funnelet, Printed Circuit	1347-0007	1347-0007	1347-0007
Funnelet, Printed Circuit	1347-0009	1347-0009	1347-0009
Funnelet, Printed Circuit		1347-0010	1347-0010
Funnelet, Printed Circuit		1347-0051	1347-0051
Funnelet, Printed Circuit		1347-0053	1347-0053
Abrasive Stick		1129-0014	1129-0014
Cir-Kit Pad Frame	1200-0070	1200-0070	1200-0070
Cir-Kit Straight Run Frame	1200-0074	1200-0074	1200-0074
Cir-Kit D.I.P. Pad Frame		1200-0072	1200-0072
Cir-Kit Variety (Angles, T's, Pads)		1200-0073	1200-0073
Cir-Kit Edge Connector Frame			1200-0071
Cir-Kit Eyelets Insert	1311-0087	1311-0087	1311-0087
Cir-Kit Insert		1311-0089	1311-0089
Adhesive Kit			1239-0011
Edge Connector Clamp Assembly			6000-0130
Hinged Cap	1311-0085	1311-0085	1311-0085
Setting Tool Assembly	6000-0051	6000-0051	6000-0051
Setting Tool Guide Assembly		6000-0054	6000-0054
Funnelet Support Tool	1332-0017	1332-0017	1332-0017
Support Tool Base	1321-0054	1321-0054	1321-0054
Cir-Kit Manual	5050-0048	5050-0048	5050-0048

2.375
REF.



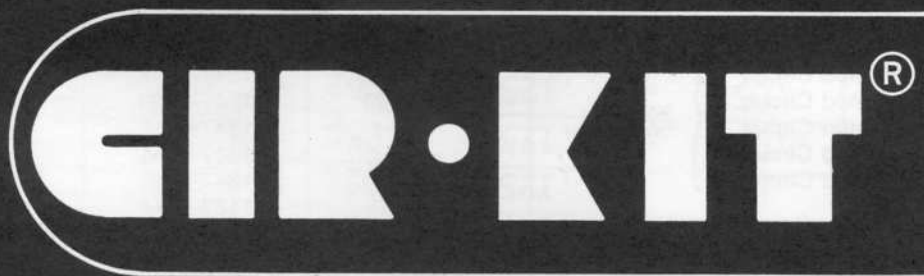
CIR-KIT™

1200-0011

3.375
REF.

PAD TABULATION CHART

PAD DESIGNATION	<i>Inside</i> DIA $\pm .003$	<i>Outside</i> DIA $\pm .003$	<i>Track</i> <i>Width</i> $\pm .003$
A	.035	.050	.020
B	.035	.050	.025
C	.035	.050	.031
D	.035	.062	.020
E	.035	.062	.025
F	.035	.062	.031
G	.035	.062	.050
H	.051	.075	.020
I	.051	.075	.025
J	.051	.075	.031
K	.051	.075	.050
L	.051	.075	.062
M	.051	.093	.020
N	.051	.093	.025
O	.051	.093	.031
P	.051	.093	.050
Q	.051	.093	.062
R	.051	.100	.025
S	.051	.100	.031
T	.051	.100	.050
U	.051	.100	.062
V	.051	.125	.025
W	.051	.125	.031
X	.051	.125	.050
Y	.051	.125	.062



**REPAIR AND REPLACEMENT SYSTEMS FOR LAND, CONDUCTOR,
THRU-HOLE, CORNER, T, DIP PAD, AND EDGE CONNECTOR**

CIRKIT is a trademark item of Pace, Inc.

A PRODUCT OF PACE, INC.

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